Notice of Allowability	Application No.	Applicant(s)
	10/046,444	TRIPATHI ET AL.
	Examiner	Art Unit
	Cicely Ware	2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment filed 12/15/2005*.

2. ☒ The allowed claim(s) is/are *1-5, 7-13, 15-23, 25-30 renumbered as 1-27*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date *1*.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

EXAMINER'S AMENDMENT

1.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Attorney Frank C. Nicholas on 1/23/2006:

DRAWINGS:

2.   The drawings were received on 12/16/2005. These drawings are accepted.

3.   Insert arrow in Fig. 1 element 25 (See Replacement Sheet).

CLAIM AMENDMENTS:

a.   Replace Claim 2 with the following:

The method of claim 1, further comprising:

generating a set of hard estimates of bits based upon a computation of the

second feed-forward filter and the second feedback filter as a function of a second set

of soft symbol estimates.

b.   Replace Claim 4 with the following:

The device of claim 3, further comprising:

means for generating a set of hard estimates of bits based upon a computation of

the second feed-forward filter and the second feedback filter as a function of a second

set of soft symbol estimates.

c.   Replace Claim 5 with the following:

A method for decoding a packet transmitted over a channel, the packet including a plurality of samples, said method comprising:

providing a first set of soft symbol estimates; and

computing a feed-forward filter and a feedback filter as a function of the first set of soft symbol estimates;

wherein the feed-forward filter and the feedback filter are computed according to:

$$\mathbf{x} = \begin{bmatrix} \mathbf{y}(i) \\ \hat{\mathbf{s}}_{\delta}^{(n)}(i) \end{bmatrix}$$

$$\begin{bmatrix} \mathbf{f}^{(n)} \\ \mathbf{b}^{(n)} \end{bmatrix} = \mathbf{R}_{\mathbf{xx}}^{-1} \mathbf{R}_{\mathbf{x}\hat{s}^{(n)}}, \quad \text{where}$$

$$\mathbf{R}_{\mathbf{xx}} = \sum_{i=0}^{M-1} \mathbf{x}(i)\mathbf{x}^{H}(i)$$

$$\mathbf{R}_{\mathbf{x}\hat{s}^{(n)}} = \sum_{i=0}^{M-1} \mathbf{x}(i)\left(\hat{s}^{(n)}(i)\right)^{*}$$

wherein y(i) is the samples, $\hat{s}_{\delta}^{(n)}(i)$ is the soft symbol estimate whose δth delay element has been set to zero, $f^{(n)}$ is the feed-forward filter, and $b^{(n)}$ is the feedback filter, M is a number of data symbols in a packet and H is a Hermitian transpose.

d.   Replace Claim 7 with the following:

The method of claim 5, further comprising:

filtering the plurality of samples through the feed-forward filter; and

filtering the first set of soft symbol estimates through the feedback filter.

e.   Replace Claim 8 with the following:

The method of claim 7, further comprising:

providing a first set of decision feedback equalization outputs in response to a filtering of the plurality of samples through the feed-forward filter and a filtering of the first set of soft symbol estimates through the feedback filter.

f.   Replace Claim 10 with the following:

The method of claim 8, further comprising:

providing a second set of soft symbol estimates; and

computing the feed-forward filter and the feedback filter as a function of the
second set of soft symbol estimates.

g.   Replace Claim 11 with the following:

The method of claim 10, further comprising:

filtering the plurality of samples through the feed-forward filter; and

filtering the second set of soft symbol estimates through the feedback filter.

h.   Replace Claim 12 with the following:

The method of claim 11, further comprising:

providing a second set of decision feedback equalization outputs in response to a
filtering of the plurality of samples through the feed-forward filter and a filtering of the
second set of soft symbol estimates through the feedback filter.

i.   Replace Claim 13 with the following:

A device for decoding a packet transmitted over a channel, the packet including a
plurality of samples, said device comprising:

a soft symbol estimator providing a first set of soft symbol estimates in response
to a reception of the packet by said device;

a feed-forward filter computed as a function of the first set of soft symbol
estimates; and

a feedback filter computed as a function of the first set of soft symbol estimates;

wherein said feed-forward filter and said feedback filter are computed according
to:

$$\mathbf{x} = \begin{bmatrix} y(i) \\ \hat{s}_\delta^{(n)}(i) \end{bmatrix}$$

$$\begin{bmatrix} \mathbf{f}^{(n)} \\ \mathbf{b}^{(n)} \end{bmatrix} = \mathbf{R}_{xx}^{-1} \mathbf{R}_{x\hat{s}^{(n)}}, \qquad \text{where}$$

$$\mathbf{R}_{xx} = \sum_{i=0}^{M-1} \mathbf{x}(i)\mathbf{x}^H(i)$$

$$\mathbf{R}_{x\hat{s}^{(n)}} = \sum_{i=0}^{M-1} \mathbf{x}(i)\left(\hat{s}^{(n)}(i)\right)^*$$

wherein y(i) is the samples, $\hat{s}_\delta^{(n)}(i)$ is the soft symbol estimate whose δth delay element

has been set to zero, $f^{(n)}$ is the feed-forward filter, and $b^{(n)}$ is the feedback filter, M is a

number of data symbols in a packet and H is a Hermitian transpose.

j.   Replace Claim 15 with the following:

The device of claim 13, wherein

said feed-forward filter filters the plurality of samples upon a computation of said

feed-forward filter; and

said feedback filter filters the first set of soft symbol estimates upon a

computation of said feedback filter.

k.   Replace Claim 16 with the following:

The device of claim 15, further comprising:

an adder providing a first set of decision feedback equalization outputs in

response to a filtering of the plurality of samples through said feed-forward filter and a

filtering of the first set of soft symbol estimates through said feedback filter.

l.   Replace Claim 18 with the following:

The device of claim 16, wherein:

said feed-forward filter is computed as a function of a second set of soft symbol

estimates;

said feedback filter is computed as a function of the second set of soft symbol estimates,

said soft symbol estimator provides the second set of soft symbol estimates in response to said adder providing said first set of decision feedback equalization outputs.

m.   Replace Claim 19 with the following:

The device of claim 18, wherein:

said feed-forward filters the plurality of samples upon a computation of said feed-forward filter; and

said feedback filter filters the second set of soft symbol estimates upon a computation of said feedback filter.

n.   Replace Claim 20 with the following:

The device of claim 19, wherein

said adder further provides a second set of decision feedback equalization outputs in response to a filtering of the plurality of samples through said feed-forward filter and a filtering of the second set of soft symbol estimates through said feedback filter.

o.   Replace Claim 22 with the following:

The computer readable medium of claim 21, further comprising:

generating a set of hard estimates of the plurality of bits based upon a computation of the second feed-forward filter and the second feedback filter as a function of a second set of soft symbol estimates.

p.   Replace Claim 23 with the following:

A computer readable medium storing a computer executable program code, the code, when executed, performs the steps comprising:

providing a first set of soft symbol estimates; and

computing a feed-forward filter and a feedback filter as a function of the first set of soft symbol estimates;

wherein the first feed-forward filter and the first feedback filter are computed according to:

$$\mathbf{x} = \begin{bmatrix} \mathbf{y}(i) \\ \hat{\mathbf{s}}_{\delta}^{(n)}(i) \end{bmatrix}$$

$$\begin{bmatrix} \mathbf{f}^{(n)} \\ \mathbf{b}^{(n)} \end{bmatrix} = \mathbf{R}_{xx}^{-1} \mathbf{R}_{x\hat{s}^{(n)}}, \quad \text{where}$$

$$\mathbf{R}_{xx} = \sum_{i=0}^{M-1} \mathbf{x}(i)\mathbf{x}^{H}(i)$$

$$\mathbf{R}_{x\hat{s}^{(n)}} = \sum_{i=0}^{M-1} \mathbf{x}(i)\left(\hat{s}^{(n)}(i)\right)^{*}$$

wherein y(i) is the samples, $\hat{\mathbf{s}}_{\delta}^{(n)}(i)$ is the soft symbol estimate whose δth delay element

has been set to zero, $\mathbf{f}^{(n)}$ is the feed-forward filter, and $\mathbf{b}^{(n)}$ is the feedback filter, M is a

number of data symbols in a packet and H is a Hermitian transpose.

q.   Replace Claim 25 with the following:

The computer readable medium of claim 24, further comprising:

filtering the plurality of samples through the feed-forward filter; and

filtering the first set of soft symbol estimates through the feedback filter.

r.   Replace Claim 26 with the following:

The computer readable medium of claim 25, further comprising:

providing a first set of decision feedback equalization outputs in response to a

filtering of the plurality of samples through the feed-forward filter and a filtering of the

first set of soft symbol estimates through the feedback filter.

s.   Replace Claim 28 with the following:

The computer readable medium of claim 26, further comprising:

providing a second set of soft symbol estimates; and

computing the feed-forward filter and the feedback filter as a function of the second set of soft symbol estimates.

t.   Replace Claim 29 with the following:

The computer readable medium of claim 28, further comprising:

filtering the plurality of samples through the feed-forward filter; and

filtering the second set of soft symbol estimates through the feedback filter.

u.   Replace Claim 30 with the following:

The computer readable medium of claim 29, further comprising:

providing a second set of decision feedback equalization outputs in response to a filtering of the plurality of samples through the feed-forward filter and a filtering of the second set of soft symbol estimates through the feedback filter.

v.   Claim 21, line 1, delete "A computer readable medium storing a computer program", insert "A computer readable medium storing a computer executable program code, the code, when executed, performing the steps"

w.   Claim 21, line 3, delete "computer readable code for".

x.   Claim 21, line 6, delete "computer readable code for".

REASONS FOR ALLOWANCE

1.   The following is a statement of reasons for the indication of allowable subject

matter: The instant application discloses a method for decoding a packet transmitted

over a channel, the packet including a plurality of samples. Prior art references show

similar methods but fail to teach: **"in a second iteration, generating a second set of**

soft estimates of bits based upon a computation of second feed-forward filter and

a second feedback filter as a function of a first set of soft symbol estimates

obtained during the first iteration", as in claim 1; **"wherein the feed-forward filter**

and the feedback filter are computed according to claims 5, 13, 23".

Conclusion

2.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Cicely Ware whose telephone number is 571-272-3047.

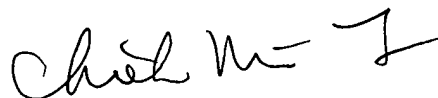The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone numbers

for the organization where this application or proceeding is assigned are 703-872-9314

for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 703-305-
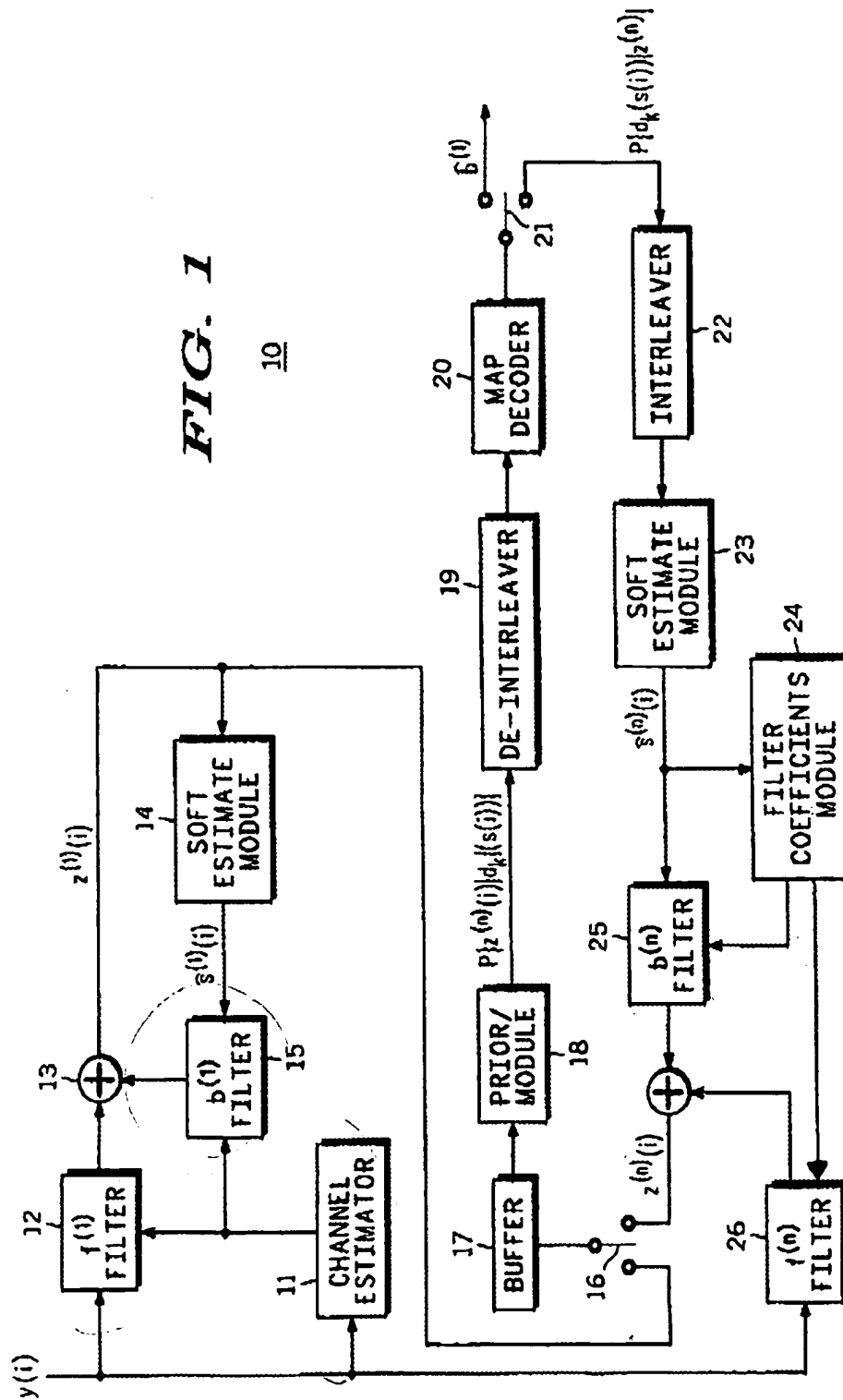
3900.

Cicely Ware

cqw
January 23, 2006

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER

1/3

FIG. 1

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